



Summary of Fishery Surveys Solberg Lake, Price County, 2013 – 2014

WDNR's Fisheries Management Team from Park Falls completed fyke netting and electrofishing surveys in fall 2013 and spring 2014 to assess the relative abundance and size structure of important fish populations in Solberg Lake. Fyke netting in October yielded useful information on black crappie. Fyke nets set shortly after the spring thaw targeted walleye, muskellunge, northern pike, and yellow perch. An electrofishing survey in late-spring focused on largemouth bass, smallmouth bass, and bluegill populations. Quality, preferred, and memorable sizes referenced in this summary are based on standard proportions of world record lengths developed for each species by the American Fisheries Society. "Keeper size" is based on known angler behavior.

Survey Effort

On October 6 – 8th, 2013 when water temperature was 56 – 57°F we set six fyke nets at the sites used in fall 2007 (near shoreline points at depths 6 – 10 feet) and fished them overnight for 12 net-nights of effort directed toward black crappie. On May 4th, 2014, one day after the ice had completely melted when water temperature was already 48 – 49°F, we fished eight fyke nets overnight and seven nets over a second night for 15 net-nights of effort focused primarily on spawning walleyes. Our spring 2014 fyke nets occupied 4 of the 6 locations used in spring 2008 when 6 net-nights of survey effort targeted early spring spawners. We returned May 20 – 23rd, 2014 and fished six fyke nets specifically for muskellunge. Water temperature over those 18 net-nights (58 – 59°F) was near the high end of optimal range that coincides with musky spawning activity. With water temperature 71 – 73°F our late-spring electrofishing survey on June 10, 2014 should have been well-timed to represent largemouth bass, smallmouth bass and bluegill populations during spawning activities. However, warmer-than-normal air temperatures in the previous three weeks lead us to believe that our electrofishing survey occurred after bass and bluegill spawning had subsided. We sampled 4.00 shoreline miles in 1.68 hour, including 1.00 mile sub-sampled for panfish in 0.48 hour.

Habitat Characteristics

Solberg Lake is an 859-acre impoundment on Squaw Creek located about 4½ miles north of Phillips, Wisconsin. Maximum and average depths are 16 and 7 feet, respectively. Low to moderate water clarity limits the maximum depth at which rooted aquatic plants can grow. Secchi disk visibility averaged 4.2 feet in summer (range 2.3 – 7.5). Dissolved organic compounds draining from wetlands contribute brown-stained water to the lake, and abundant algae also decrease water clarity. Moderate algae blooms are common in Solberg Lake, and occasionally they become severe as summer progresses.

Solberg Lake is one of the largest waterbodies in Price County, ranking second to Butternut Lake in total surface area. Solberg Lake's irregular shoreline reflects its greater potential to support littoral (near shore) communities compared to lakes with circular shape. The shallow water habitat associated with eleven islands scattered throughout the lake also increases the system's potential for littoral zone production. In summer 2013, citizen volunteer Jim Michler used a Global Position System (GPS) receiver and kayak to quantify lakebed materials that were visible at the land-water margin of Solberg Lake. Near-shore substrate was 48% muck, 32% sand, 9% rock, and 11% gravel.

Summary of Results

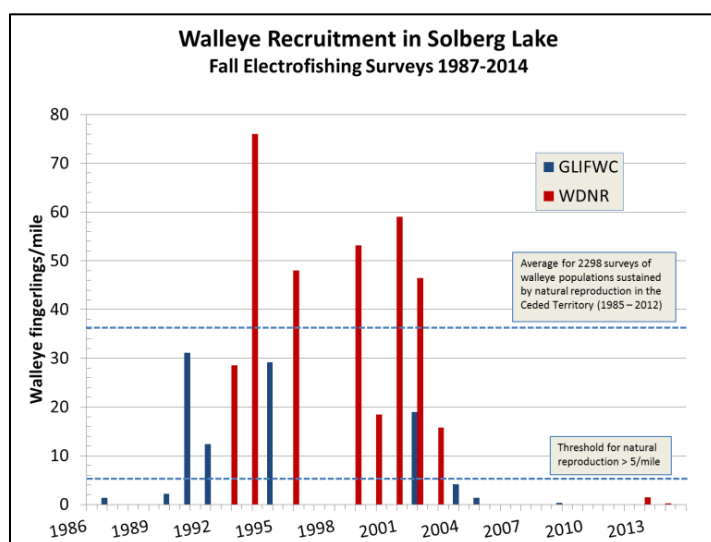
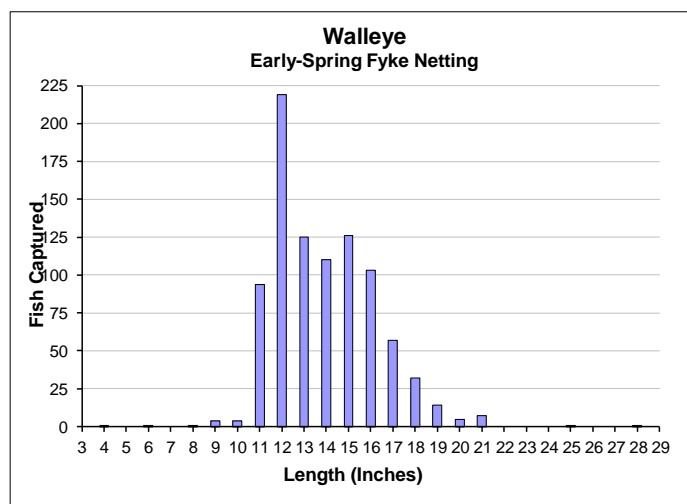
We captured 14 fish species in our netting and electrofishing surveys. Walleyes were the principal predators, and black crappies and bluegills were the most common panfish. Yellow perch, white suckers, and golden shiners complemented the forage base.

Walleye



Early Spring Fyke Nets

Captured 62 per net-night $\geq 10"$	
Quality Size $\geq 15"$	39%
Preferred Size $\geq 20"$	2%
Memorable Size $\geq 25"$	0.2%



Complaints about declining walleye fishing opportunity in Solberg Lake seemed to be supported by very low electrofishing capture rates of age-0 walleye fingerlings in five recruitment surveys completed by

WDNR and the Great Lakes Indian Fish & Wildlife Commission in fall 2004 – 2014. However, the high capture rate and favorable size distribution of adults in early spring 2014 fyke nets revealed that walleye population status is at or near the objectives defined in the *2010 Fisheries Management Plan*. Staffing constraints prevented us from estimating population density for comparison with our goal to have 4 – 7 adults per acre, but our netting capture rate was nearly twice as high as the highest rate recorded in spring 1994, 2000, 2003, and 2008 surveys. Walleyes 11 – 13 inches long comprised the highest proportion of the population as age-4 survivors of the strong 2010 year class—a year without a fall recruitment survey. Young adults in high abundance may indicate recovery from low walleye recruitment during a regional drought in 2003 – 2010, though our electrofishing capture rates of walleye fingerlings were very low again in fall 2013 and 2014. Analysis of scales taken in fall 2014 revealed that walleyes grew to 5.4 inches in their first summer ($n = 1$), 9.0 inches after two seasons of growth (range 7.9 – 9.8; $n = 8$), and 10.9 inches in 3 years (range 9.9 – 12.0; $n = 22$). The proportion of quality-size walleye in spring 2014 fyke nets was near the upper end of the objective range ($30 - 40\% \geq 15"$) and the share of preferred-size fish was just below our goal ($3 - 7\% \geq 20"$). Currently, there is no minimum length limit on walleyes in Solberg Lake. Our proposed regulation change would allow anglers to continue to keep walleyes of any size, but only one can be over 14 inches. The new rule, expected to take effect in April 2016, would focus angler harvest on the abundant, slow-growing walleyes of intermediate size and protect the larger, faster-growing walleyes so that more adults might grow to 20 inches and longer.

Muskellunge

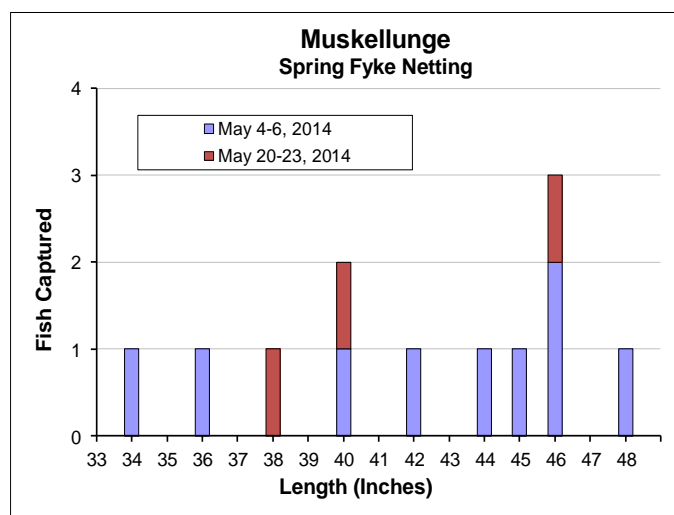


May 4-6, 2014

Captured	0.6 per net-night $\geq 20"$
Quality Size $\geq 30"$	100%
Preferred Size $\geq 38"$	75%
Memorable Size $\geq 42"$	50%

May 20-23, 2014

Captured	0.2 per net-night $\geq 20"$
Quality Size $\geq 30"$	100%
Preferred Size $\geq 38"$	67%
Memorable Size $\geq 42"$	33%



Muskellunge in spring 2014 fyke nets surpassed our goals that describe the desired size structure ($20 - 40\% \geq 38"$ and $10 - 20\% \geq 42"$). We did not estimate population density, but our capture rates of adult muskellunge in early- and mid-spring 2014 fyke nets ranked near the 38th and 12th percentiles among Class A2 musky populations that provide the best sport fishing opportunities and are sustained by natural reproduction. Though capture rate does not necessarily correlate to density, these relatively low percentile ranks suggest that Solberg Lake's musky population is near our objective for low to moderate abundance. Maintaining population abundance at current levels should help to minimize competition for

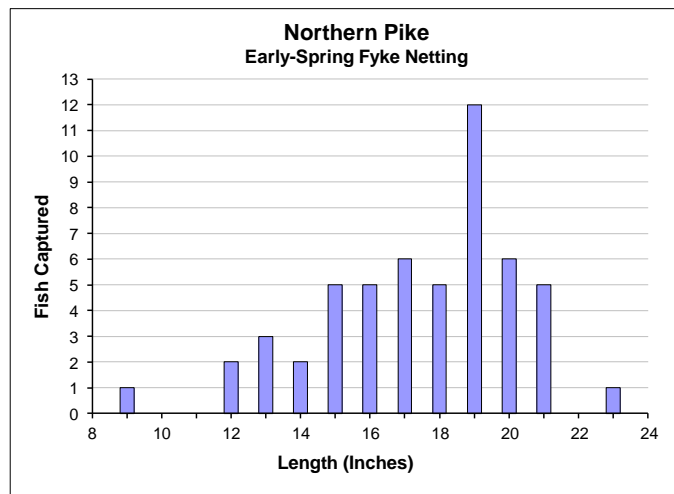
food, maintain a satisfactory growth rate, and potentially produce trophy-size muskellunge 50 inches and longer. We found evidence of natural recruitment since stocking was suspended in 2000. Age analysis using fin rays taken in spring 2014 revealed the in-lake origin of two male muskellunge (age-10 and age-12; 37.6 and 39.8 inches, respectively). Though we did not estimate their ages, the lengths of two muskellunge (36.0 and 35.3 inches) captured in fall 2013 fyke nets and two males (33.2 and 35.1 inches) in early spring 2014 nets suggest that those fish were younger than age-14, the known age of any survivors from the last group of muskellunge fingerlings stocked into Solberg Lake. Electrofishing surveys in fall 2002 and 2003 also documented fingerling and yearling muskellunge that were produced naturally after stocking ended. In 2012 when the minimum length limit on muskellunge increased from 34 to 40 inches statewide, WDNR set a 28-inch minimum length limit to accommodate the unusual preference of Solberg Lake anglers who said they would consider harvesting a muskellunge occasionally. With the strong catch-and-release ethic among musky anglers, we anticipate no change in angling harvest or muskellunge population status, regardless of the regulation in effect.

Northern Pike



Early Spring Fyke Nets

Captured	3.1 per net-night	≥ 14"
Quality Size ≥ 21"	13%	
Preferred Size ≥ 28"	0%	
Memorable Size ≥ 34"	0%	



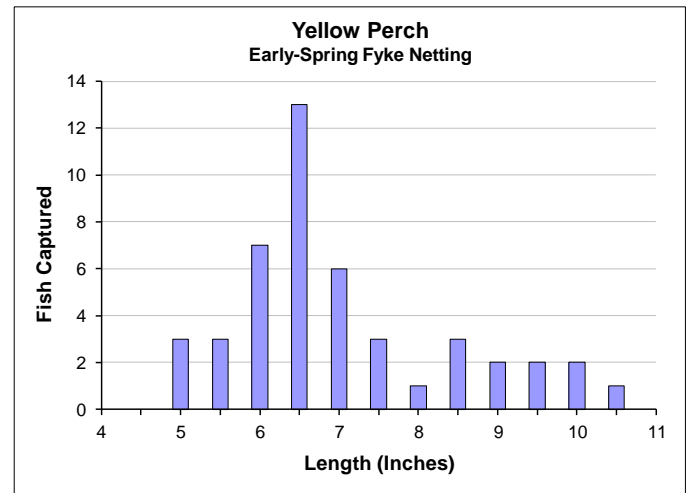
Northern pike in early spring 2014 fyke nets were captured at nearly twice the rate as they were in 2008 when nets were set too late after ice-out and water temperature was too warm to properly characterize adult population status. Fyke nets set almost immediately after ice-out in 2014 allow us to confidently describe pike abundance as low to moderate. Quality-size pike were scarce and preferred-size pike were absent in both surveys. To reduce predator density and maximize food availability for more important fish species, Solberg Lake anglers are encouraged to harvest and use northern pike under Northern Zone regulations that allow anglers to keep up to five pike of any size daily.

Yellow Perch



Early Spring Fyke Nets

Captured 5.3 per net-night $\geq 5"$	
Quality Size $\geq 8"$	24%
Preferred Size $\geq 10"$	7%
Memorable Size $\geq 12"$	0%



Comparing capture rates and length distributions in early spring 2008 and 2014 fyke nets, Solberg Lake's yellow perch population experienced a six-fold decrease in relative abundance and a substantial improvement in size structure. The proportion of quality-size perch ≥ 8 inches increased from 14% to 24%, and the share of preferred-size perch ≥ 10 inches (absent in 2008) approached the lower end of the objective range (10 – 15%). Predation by northern pike, muskellunge, and walleye may be preventing the perch population from reaching our angling-oriented goals. Each of these predators is capable of controlling perch recruitment, and pike and muskies selectively eat the largest individuals to obtain an efficient ration.

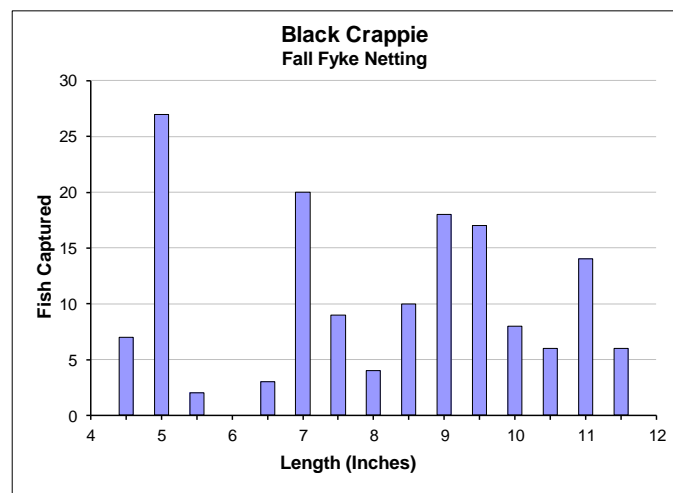
Perch of all sizes should continue to serve as the fundamental food of sport fish with higher importance to Solberg Lake anglers. Many studies have demonstrated that stocking perch and other native fish as forage for the purpose of restructuring the fish community is unnecessary and ineffective. By contrast, strategies to promote stronger and more consistent year classes of yellow perch and other forage already in the lake should help to reduce cannibalism among young walleyes and increase survival and growth rates in the walleye and muskellunge populations. Reducing predator density should help to spare more large, mature female perch to produce strong cohorts of young in years with favorable weather conditions, in turn maximizing prey availability for higher-priority fish species that prefer to eat tube-shaped perch over platter-shaped sunfishes and crappies. Replacing the submerged woody structure that landowners commonly remove to enhance conditions for recreation in the near-shore zone could provide additional high-quality substrate for yellow perch to drape their long strands of adhesive eggs, consequently improving water circulation and hatching success. The Solberg Lake Association could seek regulatory approval and funding to install whole trees from an upland source, preferably hardwoods with branches intact, as fish habitat in water deep enough to attenuate the ultra-violet light that can damage perch eggs. With high concentrations of dissolved and suspended organic material, 2 – 4 feet should be sufficient. While presently not available as a fishing regulation that WDNR could apply and enforce, the Solberg Lake Association could promote a voluntary 8-inch maximum length limit on yellow perch as a strategy to increase perch fecundity. Incorporating a voluntary maximum length limit into the proposed regulation change, Solberg Lake anglers could keep up to 5 perch in a combined daily bag limit of 15 panfish, but perch longer than 8 inches could not be kept. If we assign higher priority on perch as fish food and less emphasis on perch as food for anglers, finding the optimal balance between size and number is less important than it would be if we strived only to achieve angling-oriented objectives.

Black Crappie



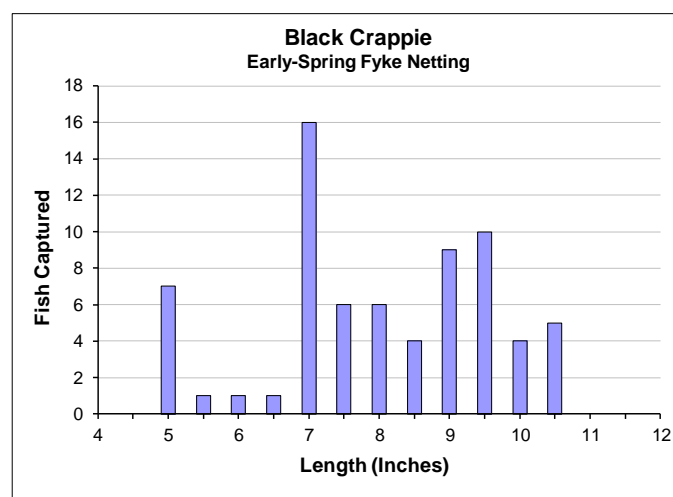
Fall Fyke Nets

Captured 12 per net-night $\geq 5"$	
Quality Size $\geq 8"$	58%
Preferred Size $\geq 10"$	24%
Memorable Size $\geq 12"$	0%



Early Spring Fyke Nets

Captured 12 per net-night $\geq 5"$	
Quality Size $\geq 8"$	54%
Preferred Size $\geq 10"$	13%
Memorable Size $\geq 12"$	0%



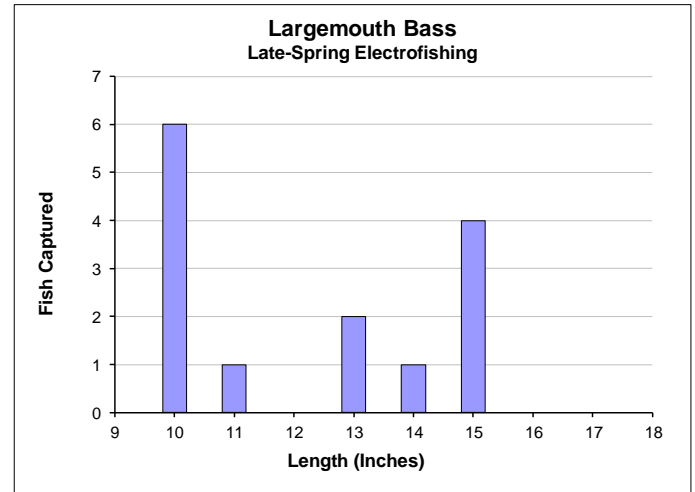
Fall and early spring fyke nets showed that black crappies in Solberg Lake currently meet our shared expectations for population density and size structure. Capture rates of crappies in spring and fall nets were identical and in the lower half of the objective range (10 – 20 crappies $\geq 5"$ per net-night) selected to represent the desired moderate level of abundance. Fall nets, but not spring nets, captured the desired proportion (20 – 40%) of crappies 10 inches and longer. The wide length distribution in both samples indicates that Solberg Lake has produced successive year classes of black crappies in the recent past. We found no evidence of the sporadic recruitment that often characterizes crappie populations in fish communities dominated by walleyes. We caution that crappie abundance may not persist at our objective level in the long term. Environmental variables and fish community interactions will almost certainly result in weak or missing year classes. Spring weather conditions, especially water temperature, have strong influence on egg and larval survival. We suspect that predation by walleye will occasionally affect crappie year class strength and their survival to adulthood, especially when young walleye are abundant. The better-than-average fishing opportunity for black crappies may be associated with lower-than-average reproductive success of walleyes that has been documented several times in the last decade. A proposal to reduce the bag limit from 25 to 15 panfish daily, including no more than 5 crappies, 5 perch, and 5 sunfish, may help to increase average crappie size and moderate the boom-and-bust cycles in crappie abundance that often occur when a strong year class grows to desirable size and anglers quickly fish them down.

Largemouth Bass



Late Spring Electrofishing

Captured	3.5 per mile or 8.3 per hour $\geq 8"$
Quality Size $\geq 12"$	50%
Legal Size $\geq 14"$	36%
Preferred Size $\geq 15"$	29%



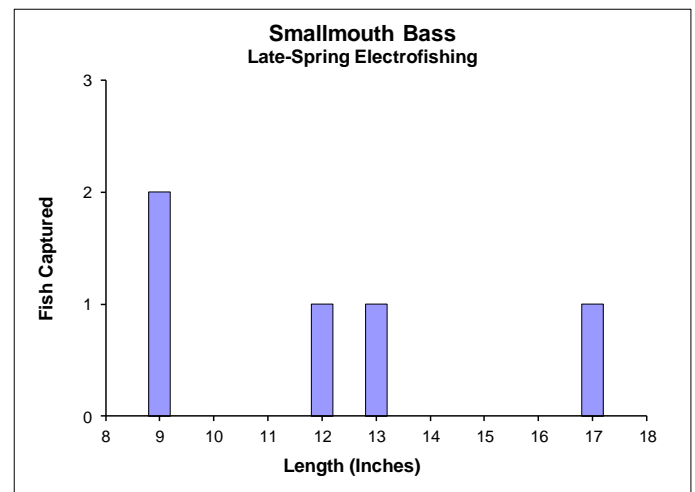
Nighttime electrofishing captured largemouth bass at nearly identical low rates in late spring 2008 and 2014, indicating that the population has not increased from its low level of abundance. With low sample size we cannot confidently assess size structure, but the proportion of preferred-size bass increased from 0% in 2008 to 29% in 2014. Still, we found no largemouth bass longer than 16 inches. Largemouth bass were nearly twice as abundant as smallmouth bass in spring 2008, and six years later largemouths outnumbered smallmouths by nearly 3 to 1. At low density, largemouth bass are not yet compromising our ability to attain the fishery that most people want in Solberg Lake. Nonetheless, we encourage anglers to responsibly keep and use largemouth bass over 14 inches long to reduce food competition with higher-priority fish species. If late spring electrofishing capture rates approach or exceed 10 largemouth bass per mile, then we should consider strategies to decrease largemouth bass density, including liberalized harvest regulations, to minimize predation and competition that we suspect may suppress walleye recruitment rates when largemouth bass populations surpass that threshold level of abundance.

Smallmouth Bass



Late Spring Electrofishing

Captured	1.3 per mile or 3.0 per hour $\geq 7"$
Quality Size $\geq 11"$	60%
Preferred Size $\geq 14"$	20%
Memorable Size $\geq 17"$	20%



Electrofishing capture rates in late spring 2008 and 2014 revealed a slight decrease in the already low abundance of smallmouth bass in Solberg Lake. We noted a similar trend over the same period in surveys of smallmouth bass populations in nearby Butternut Lake and the Phillips Chain of Lakes. With

only 5 fish in our sample we cannot evaluate length distribution beyond having at least some assurance that smallmouth bass are capable of attaining memorable size.

Bluegill

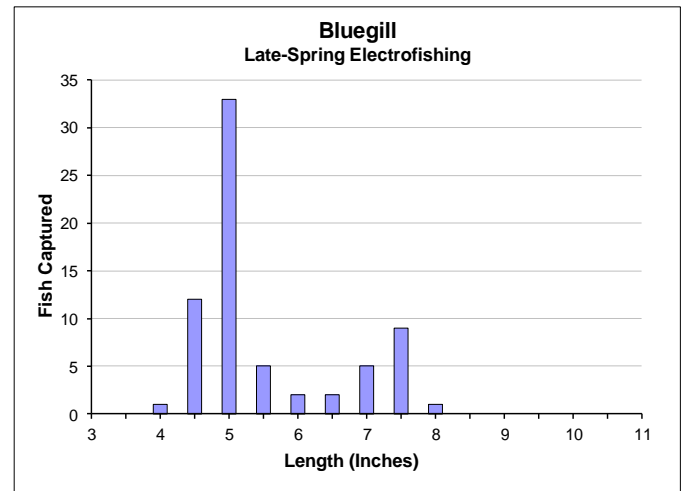
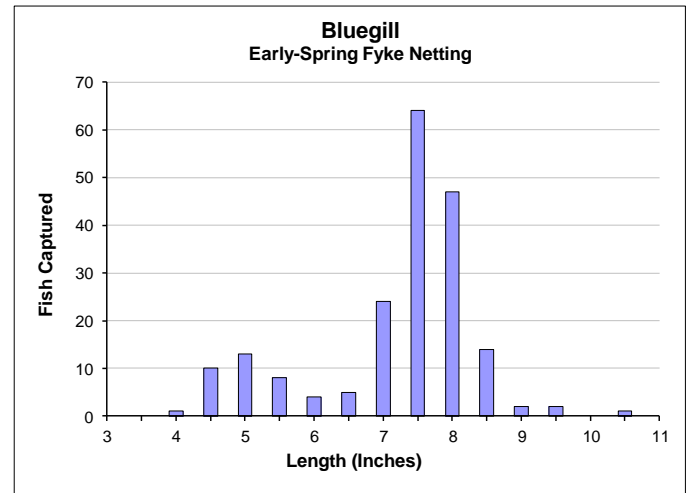


Early Spring Fyke Nets

Captured 44 per net-night ≥ 3 "	
Quality Size ≥ 6 "	84%
Keeper Size ≥ 7 "	79%
Preferred Size ≥ 8 "	34%

Late Spring Electrofishing

Captured 70 per mile or 146 per hour ≥ 3 "	
Quality Size ≥ 6 "	27%
Keeper Size ≥ 7 "	21%
Preferred Size ≥ 8 "	1%



Our electrofishing catch rate was within the objective range (75 – 150 bluegills ≥ 3 " per hour) selected as our goal for moderate population density. Measures of bluegill population size structure varied considerably between early spring fyke netting and late spring electrofishing surveys. The proportion of keeper-size bluegills captured in early spring nets was almost four times higher than that captured by electrofishing two weeks later. A third of bluegills in early spring nets were 8 inches or longer, far exceeding our goal (15 – 20%), but preferred-size bluegills were nearly absent in our electrofishing sample. We noted a similar difference in our spring 2010 assessments of the bluegill population in 2,714-acre Chequamegon Waters Flowage where 19% of bluegills in fyke nets were ≥ 8 inches, but preferred-size bluegills went undetected by electrofishing 54 days later. Under statewide regulations anglers may keep 25 panfish daily, yet under low to moderate fishing pressure, it is unlikely that selective angling harvest of the largest bluegills could deplete preferred-size fish in the brief period between our netting and electrofishing surveys. In both instances, unseasonably warm air temperatures preceded our electrofishing surveys—in the low 90s that day in 2010 at Chequamegon Waters and in the 70s and 80s for three weeks before our 2014 survey in Solberg Lake, but we do not know if weather affected bluegill spawning behavior. Large male bluegills may have originally nested in or dispersed to

deeper water where they would not be visible to us or vulnerable to capture by electrofishing. In an experimental attempt to improve and maintain satisfactory bluegill size, a new harvest regulation would allow Solberg Lake anglers to keep up to 5 bluegills and other sunfish, 5 crappies, and 5 perch in a combined daily bag limit of 15 panfish. If approved, the regulation change will take effect in April 2016, and our next surveys scheduled in spring 2020 will monitor any resulting changes in the bluegill population.

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